Parkland College

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2019

The Measles Vaccine

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BIO-123-202

5 August 2019

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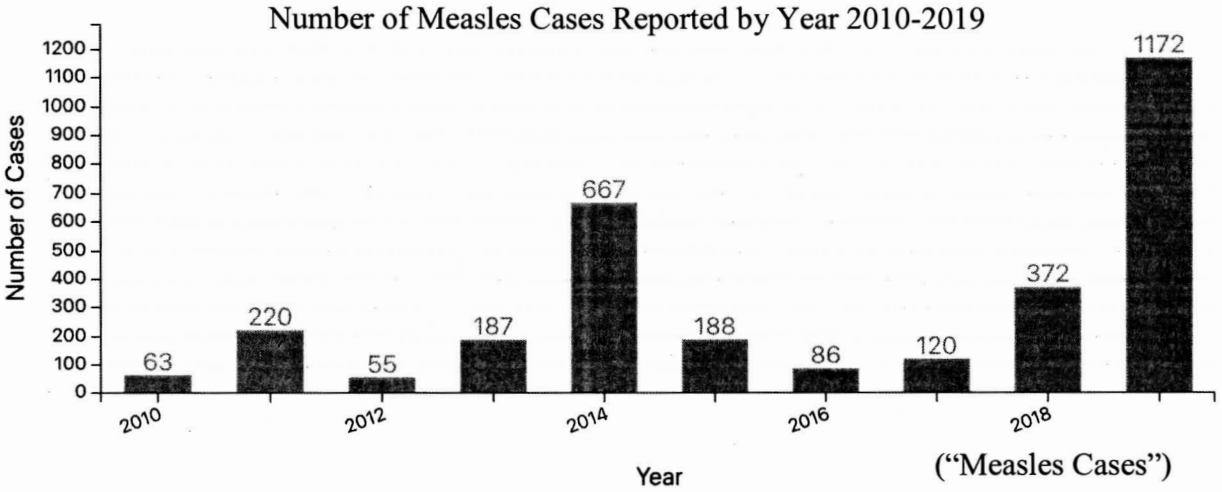
In the past few years, a vast amount of people have decided to stop getting vaccinations for themselves or their children. This comes from the thought that vaccines do not work or that they are even dangerous. Vaccines are extremely important for the health of individuals, as well as the overall health of a general population. The effects of people that do not believe in vaccinations have started to take its toll. There was a small measles outbreak within Champaign County earlier this year which infected four people. There were 1,172 cases reported in 30 different U.S. states in 2019 alone ("Measles Cases"). Measles is a very contagious disease that must be taken seriously. The chart below from the CDC shows the number of measles cases by year.



("Measles Cases")

Measles is a very dangerous virus because of how contagious it is. Over 80% of unvaccinated people exposed to the virus become infected with the measles virus and develop the disease. One of the most distinguishable symptoms is the development of Koplik's spots.

These spots are seen on the mucous membranes of the mouth. Other symptoms that appear before Koplik's spots include fever, sore throat, headache, dry cough, and inflammation around the eyes. Eventually raised lesions can be seen covering the rest of the patient's body (Lloyd, "C-10"). These previously stated symptoms cause infected people to be very uncomfortable, however those symptoms are very mild compared to other complications caused by the virus. Some of the complications include pneumonia, encephalitis which can lead to deafness or intellectual disability, and respiratory and neurologic complications, and even death. A rare complication called Subacute sclerosing panencephalitis, or SSPE, can occur years after a person recovers from measles. It is a disease of the central nervous system which can cause brain damage ("Measles Complications").

John Enders created the measles vaccine by collecting the blood of several infected students in 1954 in Boston, Massachusetts. The virus was successfully isolated in the blood of 13-year-old David Edmonston's blood and then Enders and his colleagues continued to test and develop the vaccine for the next nine years. The vaccine was fully developed and licensed in 1963. The same vaccine is still used in the U.S. ("Measles History"). This vaccine is given as a combination vaccine commonly known as the MMR vaccine; it protects against measles, mumps, and rubella. It is a live attenuated combination vaccine contains living avirulent microbes that are weak enough that they do not cause disease. Then the helper T cells are able to recognize the actual virus and activate cytotoxic T cells to release perforin and granzymes to kill infected cells. The helper T cells will also activate B cells to secrete antibodies (Lloyd, "C-9").

In 1998, Andrew Wakefield and colleagues released a paper that describes their studies regarding 12 children with regressive development disorder, or autism, and chronic enterocolitis. This paper was the initial scare that linked autism and bowel disease to the MMR vaccine.

Wakefield believed that the vaccine caused disruption of intestinal tissue which then leads to bowel disease and autism (Wakefield). The paper caused a lot of controversy that is still debated today. This paper had scared many parents from wanting to vaccinate their children.

In 2010 Wakefield's paper was retracted after there was enough evidence to prove his claims incorrect. Following this event, there was an investigation which concluded that Wakefield's research was falsified, and he was guilty of deliberate fraud. It was also found that Wakefield's research was funded by lawyers that represented parents in lawsuits against vaccine companies (Rao). With all of this information about the fraudulent paper, many would think that Wakefield's paper would be completely disregarded.

Even though Wakefield's research had been found completely fraudulent, the antivaccine movement remains indirectly affected by his work. The antivaccine movement continues to support and believe his research that there is some sort of connection between the MMR vaccine and autism. A large influencer in the antivaccine movement has been Jenny McCarthy. In 2007, actress Jenny McCarthy blamed vaccinations for her son's autism ("The Anti-Vaccination"). Other celebrities have spoken out against vaccines in the past as well. This influenced many people to join the antivaccine movement and not vaccinate their children.

In 2000, there were cases of measles transmitted within the U.S.; it was completely eliminated. However, measles eventually returned in 2013 when enough people had joined the antivaccine movement ("The Antivaccine"). There have been thousands of cases since then. The recent outbreaks of measles influenced researchers to conduct further studies on the long-term effects of the disease. In 2015, researchers released a new discovery that the long-term effects of measle are far more dangerous than we had originally imagined. They found that the effects of measles cause a depletion of B and T lymphocytes. B and T lymphocytes are our

bodies' main weapons against foreign body microbes such as viruses and bacteria. The researchers had found that the depletion lasted about two to three years after the measles symptoms were gone. During years following measles outbreaks, the researchers had noticed a spike in nonmeasle deaths. This new evidence should influence people more than ever to vaccinate themselves and their children.

There are a few situations in which people should not receive or wait to receive the MMR vaccine. These situations include people that have life threatening allergies to the vaccine, pregnant women, people with weakened immune systems, or a person that has tuberculosis ("Who"). While these people wait to be able to get the vaccine, they should be protected by herd immunity. Herd immunity is when there enough vaccinated people in a community, that unvaccinated people should be just fine since they won't be exposed to anyone with a vaccine-preventable disease. However, herd immunity can be a very sensitive form of prevention because it will fail as soon as the vaccination rate decreases. This is yet another reason why it is so important for all able-bodied people to vaccinate against preventable diseases.

The benefits of the MMR vaccine clearly outweigh the risks of measles and all other complications that arise from the disease. The vaccine is a great opportunity to improve the overall health of communities, as well as the world. With more public education on the importance and safety of vaccination, it would be very possible to eliminate the risk many different strains of viruses and vaccine preventable diseases.

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